**The Caltech/MIT Voting Technology Project**
***Where We Have Been, Where We Are Going***

**Project Update: January 2003**

A. Introduction

Americans are proud of their democracy. But the controversy over the Florida election recount revealed profound flaws in the way we vote. Immediately after the 2000 election, the smooth transition of government, a hallmark of American democracy, seemed to hang on the workings of antiquated computer technology – the punch card. Even more profoundly, the 2000 and 2002 elections both revealed that the electoral process itself is evolving due to the impact of new information technologies, especially computer literacy and accessibility. It is essential that this evolution be guided by science and not left to chance.

B. The Challenge: November 2000 and the Electoral Process

As the 2000 election all-nighter turned into a month-long legal quandary, Caltech President David Baltimore and MIT President Charles Vest realized that our institutions could offer unique assistance to the federal and state governments as they confronted problems exposed by the election. Presidents Baltimore and Vest first assembled a working group of political scientists, economists, engineers, and computer scientists on both campuses, and then persuaded the Carnegie Corporation of New York to provide funding for the first phase of the project. This multidisciplinary and bi-coastal group of scholars then researched the problems revealed in the 2000 election.

C. Step 1: Identify the Issues

In the summer of 2001, the Caltech and MIT team published "Voting: What Is, What Could Be." This report was the first major report on the problems in the electoral process.

As many as 6 million votes, we found, may have been lost in the 2000 election, due to faulty voting equipment, inaccuracies in the voter registration database, long polling place lines, and other problems. Based on our research, we issued a series of policy recommendations, the most immediate of which were:

- replace all punch card and lever voting machines with new voting systems
- improve voter registration systems, in particular, implement the aggressive use of provisional balloting

Our Report provided the basic research that guided the deliberations of policy makers at the state and federal levels. The Project provided the technical support for the Ford-Carter Commission. Project members made dozens of public presentations all around the nation, including briefings for Congressional staff in Washington and testimony for various Congressional committees involved in drafting the federal election reform legislation. Project members were also deeply involved in reform efforts in a number of states, including Florida and California.

We are happy to report that many of our most immediate recommendations are being implemented in states throughout America, and that much of the recently passed federal election reform legislation ("The

Help America Vote Act") should accomplish many of our recommended reforms. This bill was signed into law by President Bush in November 2002.

D. The Next Steps – Voting Reform, Digital Divide, and Information Technology

New federal and state laws, however, are just the beginning. In the short term, a great deal of research and policymaking work will be required to make sure that state and federal reforms are implemented adequately. For example, there exists no store of information that state and local election administrators can turn to about best practices for making ballots easier to use or for implementing new registration systems. Also needed is continued monitoring of the reliability of the system. We established the key measures – lost votes and residual votes – for assessing the performance of the election system. Collecting this information and sharing it with the public, the media, and election officials will be essential for demonstrating where the nation has made improvements and where it needs to redouble its efforts.

But, we learned something even more important in our initial inquiries – America is on the verge of even more profound transformation in the way people vote. As computer literacy and information technology become universal, the momentum is developing for an entirely new voting system, not one modeled on the 19th Century, as our current practices are. When members of our project make public presentations, we are already hearing this demand: why can't I vote on the Internet?

The voting technologies being implemented today will not satisfy this demand. The voting technologies implemented today – "touchscreen" computers and optically scannable paper ballots -- do not capture the power of the information revolution. The American public, for its part, wants convenience. In 1972, five percent of Americans voted absentee; in 2000, 15 percent voted absentee. In California and Florida absentees amounted to almost 1 in 4 ballots; 1 in 2 Washington state voters voted absentee; and every ballot cast in Oregon was absentee. Election administrators, for their part, want a system that is easier to manage and that is more readily upgraded. Administrators buy new equipment every 20 years or so, an unimaginable lag time for computer technology.

The transition to Internet voting is already underway in the US and elsewhere in the world. Michael Alvarez is working with the Defense Department on expanding its program, initiated during the 2000 election, to provide for absentee balloting for military personnel. In the UK, Internet pilot trials were held in the May 2001 local council elections, and the Swiss have tried Internet-enabled elections at a local level as well. And, about 25 percent of all stockholder ballots cast in elections of publicly traded companies are cast over the Internet. There are, however, no standards for security – a problem made more difficult by the fact that the vote is secret and "receipt free" – and there is the prospect that the digital divide may create inequities in participation in America.

Our agenda, as we move forward, is to tackle the issues facing networked electronic voting. How do we make a system that will be usable by all and equally accessible to all? How can we make anonymous and receipt-free transactions secure, a problem with profound implications beyond voting?

Engineers on our team, including Ron Rivest (MIT Lab for Computer Sciences), Jehoshua Bruck (Caltech, Computer Sciences), and Ted Selker (MIT Media Lab), have begun to develop system architectures that seem promising. For example, we have developed a system that would allow election administrators to use school computers as voting machines – effectively getting rid of obsolete hardware. This has the potential to be the basis for a federal initiative in which all schools are provided with state-of-the-art computer technology, in exchange for allowing the election office to use the school's computers on the rare days on which we hold elections. Our social scientists are eager to begin research on current practices in absentee voting, to study the problem of voting security and fraud, and to examine closely methods to eliminate the digital divide.

The Caltech/MIT Voting Technology Project is uniquely situated to be an important force in the coming decade as our electoral process enters a period of unprecedented change and scrutiny. We are excited about the impact that our work has had so far, and we look forward to having the opportunity to carry forward our research and policymaking work to make the electoral process work for all Americans.

CALTECH/MIT VOTING TECHNOLOGY PROJECT